

Regulating agro-forest areas for a sustainable cork harvest

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Abstract

Portugal is the first cork producer in the world. The national cork oak areas have been slightly increasing since the middle of last century. Nevertheless, cork yield sustainability is not ensured due to increasing loss of stands vitality (only in 40% of the stands no damage was observed). Cork oak (*Quercus suber* L.) stands have mostly an uneven-aged structure (68%). The existing even-aged stands don't have an age distribution that may promote these areas sustainability: 34% have more than 60 years and 31% are between 20 to 40 years old and only 14% are young stands with less than 10 years. Therefore, efforts should start to be made at the forest management unit level to overcome this constraint.

In this study an agro-forestry area of cork oak partial affected by fire was considered. Even though having a forest management plan, the existing management compartments didn't allow for a sustainable cork annual harvest. To achieve sustainability the area control method for forest regulation was first applied, using a cycle of nine years through a 27 years planning horizon. Later, cork annual yield was also considered in the forest regulation analysis. Cork yield was simulated along the 27 years period using the individual tree growth and yield model Suber. Finally, the proposed management unit compartments were produced as vector layer a GIS and the attribute table organized with all the information available in order to support forest management.

In a first stage, a medium-long term planning was obtained. As a result, it was proved that a quite stable annual cork harvest could be achieved for the first nine year cycles. After each nine year cycle, planning must be re-evaluated with updated inventory data. Reaching to the end of the 3rd cycle it will be possible to regenerate old stands (age more than 60 years), as young stands were reaching the harvesting diameter (age around 30 years), without cork annual harvest loss. This strategy proved to be possible achieving sustainability for agro-forestry areas of cork oak, while regenerating old stands, using both the area and volume control method combined.

Key words: *Quercus suber* L.; cork yield; forest regulation; sustainability